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EXAMINER	
SHIN, MARC L	

ART UNIT	PAPER NUMBER
2836	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/068,391	RICHEY, JOSEPH B.	
	Examiner	Art Unit	
	Marc L Shin	2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-10 and 12-17* is/are rejected.

7)☒ Claim(s) *5 and 11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/4/2002*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 14 recites the limitation "the power source". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, and 6 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Seto (6,107,761) and Couture et al (5,418,437).

Seto discloses an electric vehicle with:

- a battery power supply (12) (see Fig 2)
- a control circuit (10) in circuit communication with the battery power supply (12), the control circuit comprising:
    - o a motor drive circuit (25) in circuit communication with a motor (7) (see Fig 2).

The battery power supply (12) reads on a power source. The control circuit (10) reads on a control circuit comprising a drive circuit in circuit communication with at least one motor.

Regarding claim 1, Seto does not disclose:

A. a voltage booster circuit in circuit communication with the power source

B. a switch in circuit communication with the power source, voltage booster circuit, and control circuit, the switch comprising a first state for connecting the power source to the control circuit and a second state for connecting the voltage booster circuit to the control circuit.

Couture et al teaches a motor vehicle drive system for a motor vehicle having an electric motor system, an actuating system, an accelerator system, a mode selector, and a battery (see Abstract). Couture et al further teaches:

A. a bi-directional step-up/step-down converter (32) connected to a battery (14) (see Fig 1, and col 5, lines 14-27). The step-up/step-down converter reads on a voltage booster circuit.

B. A switch (34) connected to a battery (14) , step-up/step-down converter (32), and a control circuit (16). The switch has a first state (open) for connecting the battery (14) to the control circuit (16), and a second state (closed) for connecting the step-up/step-down converter (32) to the control circuit (16) (see Fig 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the electric vehicle drive system of Seto to include the bi-directional step-up/step-down converter connected to the battery power supply and a switch connected to the battery power supply for connecting the battery to the control circuit in a first state and connecting the step-up/step-down converter to the control circuit in a second state, as taught by Couture et al. The motivation would have been to utilize the regulator (32) to optimize the power drawn from the battery and provide the desired voltage independently of the charge state of the battery or the battery current/voltage function (see Couture et al, col 5, lines 16-22).

Regarding claim 2, Couture et al teaches a step-up/step-down converter, which reads on a voltage converter (see col 4, lines 30-41).

Regarding claim 3, Couture et al teaches a bi-directional step-up/step-down converter that comprises an input and an output, where the output voltage is higher than the input voltage(see col 5, lines 15-20).

Regarding claim 4, Couture et al teaches a bi-directional step-up/step-down converter that comprises an input and an output, where the output voltage is lower than the input voltage (see col 5, lines 15-20).

Regarding claim 6, Couture et al teaches that the power switch (34) is controlled by a main controller (16) (see col 4, lines 30-41).

5. Claim 7-10 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Seto (6,107,761) and Couture et al (5,418,437).

Seto discloses an electric vehicle with:

- a battery power supply (12) (see Fig 2)
- a control circuit (10) in circuit communication with the battery power supply (12), the control circuit comprising (see Fig 2):
    - o a drive output signal outputted by an output voltage control circuit (25c) (see Fig 3)
    - o a motor drive circuit (25) in circuit communication with a motor (7) (see Fig 3).

The battery power supply (12) reads on a power source. The control circuit (10) reads on a control circuit comprising a drive circuit in circuit communication with at least one motor.

Regarding claim 7, Seto does not disclose:

C. a voltage booster circuit in circuit communication with the power source

D. a switch in circuit communication with the power source, voltage booster circuit, and control circuit, the switch comprising a first state for connecting the power source to the control circuit and a second state for connecting the voltage booster circuit to the control circuit.

E. Logic for controlling the state of the switch based on the drive output signal

Couture et al teaches a motor vehicle drive system for a motor vehicle having an electric motor system, an actuating system, an accelerator system, a mode selector, and a battery (see Abstract). Couture et al further teaches:

C. a bi-directional step-up/step-down converter (32) connected to a battery (14) (see Fig 1, and col 5, lines 14-27). The step-up/step-down converter reads on a voltage booster circuit.

D. A switch (34) connected to a battery (14) , step-up/step-down converter (32), and a control circuit (16). The switch has a first state (open) for connecting the battery (14) to the control circuit (16), and a second state (closed) for connecting the step-up/step-down converter (32) to the control circuit (16) (see Fig 1).

E. A control circuit (16) for controlling the state of the switch (34) based on the drive output signal outputted by the power supply bus (12) to the power converter system (18) (see Fig 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the electric vehicle drive system of Seto to include the bi-directional step-up/step-down converter connected to the battery power supply and a switch connected to the battery power supply for connecting the battery to the control circuit in a first state and connecting the step-up/step-down converter to the control circuit in a second state, as taught by Couture et al. The motivation would have been to utilize the regulator (32) to optimize the power drawn from the battery and provide the desired voltage independently of the charge state of the battery or the battery current/voltage function (see Couture et al, col 5, lines 16-22).

Regarding claim 8, Couture et al teaches a step-up/step-down converter, which reads on a voltage converter (see col 4, lines 30-41).

Regarding claim 9, Couture et al teaches a bi-directional step-up/step-down converter that comprises an input and an output, where the output voltage is higher than the input voltage(see col 5, lines 15-20).

Regarding claim 10, Couture et al teaches a bi-directional step-up/step-down converter that comprises an input and an output, where the output voltage is lower than the input voltage (see col 5, lines 15-20).

6. Claims 12 and 13 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Seto, Couture et al, and Saijima (5,530,788). Seto and Couture et al disclose a system for driving an electric vehicle comprising a controller for controlling the state of a power switch based on the power required by the electric motors, as discussed in claim 7 above. Seto and Couture et al do not disclose controlling of the power switch to switch to a second state when the drive output signal is above a predetermined threshold, and a first state when the drive signal is below a predetermined threshold level.

Saijima teaches an electric motor drive control apparatus comprising a microcomputer (7) for controlling a drive circuit having a supply of electric power from a power source to drive an electric motor (1) (see Abstract). Saijima further teaches that the drive circuit includes at least one switching element operable between a first state connecting the motor to the power source and a second state disconnecting the electric motor from the power source (see Abstract), when the current flow through the motor exceeds a predetermined value (see Abstract).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system for driving an electric vehicle of Seto and Couture et al to include the drive circuit with at least one switching element operable between a first and second state, when the drive signal is above or below a threshold value, as taught by Saijima. The motivation would have been to protect the motor from being driven with too much current.

7. Claims 14-15 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Couture et al and Saijima (5,530,788)

Couture et al discloses a motor vehicle drive system for a motor vehicle having an electric motor system comprising:

- A battery (14) connected with a step-up/step-down voltage regulator (32), with a switch (34) that can bypass the operation of the step-up/step-down regulator (see Fig 1). The first voltage output is the voltage output by the battery, with the switch (34) closed. The second voltage output is the voltage output by the step-up/step-down converter (32), when the switch (34) is open. The battery connected to a regulator (32) reads on a power circuit comprising at least first and second voltage outputs.
- A control circuit (15c) in circuit communication with the battery (14), the control circuit (15c) outputs a drive signal to the drive circuit (16) to drive a motor (18) (see Fig 1). This reads on a control circuit in circuit communication with the power source, the control circuit having a drive signal in circuit communication with a drive circuit for driving a motor.
- The switch (34) in circuit communication with a power circuit (12). The switch in the closed state (reads on a first state) outputs the first voltage from the battery supply (14) to the control circuit (16). The switch (34) in the open state (reads

on a second state), outputs a second voltage from the step-up/step-down converter to the control circuit (16) (see Fig 1).

Regarding claim 14, Couture et al does not disclose that the control circuit comprises:

A. Logic for sampling a drive signal.

B. Logic for comparing the sampled drive signal to a predetermined threshold

C. Logic for changing the state of the switch based on the comparison of the sampled drive signal to the predetermined threshold.

Saijima teaches an electric motor drive control apparatus comprising a microcomputer (7) for controlling:

A. A current monitoring section (7A) for monitoring a motor current signal (see col 2, lines 43-48).

B. An over-current detecting circuit (6) that compares the motor current signal with a higher reference value I_{MAX1} when the motor current signal is increasing and with a lower reference value I_R when the motor current signal is decreasing (see col 2, lines 46-59).

C. Drive circuits (10) and (11) that drive the switching elements (Tr1, Tr2, Tr3, Tr4) based on the comparison of the motor current signal to the reference values (see col 4, lines 31-51).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the control circuit of Couture et al with the microcomputer based control apparatus for controlling switches based on a comparison of drive signals with the reference values, as taught by Saijima. The motivation would have been to protect the motor from being driven with too much current.

Regarding claim 15, Saijima teaches that the drive signals outputted from the drivers (10) and (11) are comprised of a pulse width modulated control signals fed through AND circuits (12) and (13) (see col 2, lines 20-28).

8. Claims 16 and 17 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Couture et al, Saijima, and Nielsen et al (5,084,658).

Couture et al and Saijima disclose a system for controlling an electric vehicle where the drive signal is comprised of a pulse width modulated signal, as discussed in claim 15 above.

Regarding claim 16, Couture et al and Saijima do not disclose that the predetermined threshold of the drive signal comprises a duty cycle ratio threshold.

Nielsen et al teaches a motor speed control system for an electrically powered vehicle in which the control system includes an electric motor connected to a power supplying element for delivering electrical energy to the motor in response to a control

signal (see Abstract). The control signal reads on the drive signal. Nielsen et al further teaches that the control signal has a duty cycle in a range between a minimum and a predefined value (see Abstract). This reads on a predetermined threshold comprises a duty cycle ratio threshold.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the predetermined threshold of the drive signal to be a duty cycle ratio threshold, as taught by Nielsen et al. The motivation for putting a minimum limit on the duty cycle ration would have been to prevent stalling of an electric motor (see Nielsen et al, col 1, lines 22-40).

Regarding claim 17, having a minimum duty cycle ratio of 75% is an engineering design choice.

Allowable Subject Matter

9. Claims 5 and 11 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 5, the voltage converter's negative terminal comprising a voltage approximately equal to the voltage of the positive terminal of the power source, in the combination as claimed is not disclosed in the prior art of record.

Regarding claim 11, the voltage converter's negative terminal comprising a voltage approximately equal to the voltage of the positive terminal of the power source, in the combination as claimed is not disclosed in the prior art of record.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marc L Shin whose telephone number is 5712722267. The examiner can normally be reached on M - F 8AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on 571-272-2058. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Marc L Shin
Examiner
Art Unit 2836

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